ELECTRO-TECHNOLOGY

ANNOTATED EDITORIAL INDEX

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Common-Mode Considerations for Differential Operational Amplifiers, D. Taskett ..... May 40
Discussion of common-mode rejection ratio in differential operational amplifiers and its relation to gain and impedance.

Analog

Common-Mode Considerations for Differential Operational Amplifiers, D. Taskett ..... May 40
Discussion of common-mode rejection ratio in differential operational amplifiers and its relation to gain and impedance.

Digital, Logic

Logic for Visual Displays, A. L. Polinsky and J. R. McCall ..... Feb 46
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Simplified Sequential-Counter Design, S. S. Golenski ..... Feb 93
A method of designing digital counters by using only one Veitch diagram for each flip-flop.

Partition Techniques for Switching Logic, H. F. Najjar ..... April 50
Digital logic design can be improved by using new methods of code assignment based on partition theory.

Sequence-Free Switching, M. T. Ardon and C. A. Halijak ..... April 90
Switching networks are constructed so that the output depends solely on the number of inputs regardless of the input sequence.

Guidelines for Partitioning in Large-Scale Integration, J. K. Imai and E. R. deAtley ..... Aug 50
Ground rules for partitioning large-scale integrated circuits are illustrated by designs using MOS chips.

Filters

Simplified Signal Splitting with a Resistance Hybrid, F. M. Brock ..... Aug 58
The asymmetrical resistance hybrid is proposed as a substitute for transformers in signal splitting. Design charts are presented, and insertion-loss relations are developed.

Frequency Multipliers

High-Power Varactors in Multipliers, G. Schaffner. Jan 81
Step-recovery diodes can be used as varactors in frequency multipliers to give output power greater than 5 watts at 2 Gc with very high efficiency. Design guidelines for resonant-cavity varactor multipliers are presented.

Integrated Circuits

Designing with Monolithic Operational Amplifiers, L. Wisseman and J. Robertson ..... Feb 50
Monolithic operational amplifiers provide a fast and inexpensive method for producing circuit functions without detailed circuit design.

Compatibility in Monolithic Integrated Circuits, J. E. Harlow III and H. C. Josephs ..... Jun 42
The structures of various circuit elements—transistors, FET's, MOST's, SCR's, etc.—in monolithic integrated circuits are described, and charts are presented for qualitatively determining the compatibility of various pairs of circuit elements.

Design Trade-Offs for Integrated Sense Amplifiers, S. T. Robertson ..... Nov. 79
A case history of the development of a monolithic sense amplifier for magnetic-core memories. Design criteria are established for threshhold voltage, uncertainty region, power-supply voltage, output waveform, bandwidth, and other factors. A circuit is designed, built, and evaluated in terms of these criteria. The author analyzes the reasons behind the necessary changes and describes the performance of the final version of the circuit.

Inverters

Analog Simulation Simplifies Static Power-Inverter Design, J. E. Murray ..... Dec 36
Inverters using only two semiconductor switches with no regulation or filtering can be designed fairly easily. When power-supply fluctuations and load variations require more complex circuits, the design procedure is simplified by the use of analog simulation. Test values obtained from the simulation are used to specify circuit components such as SCR's, diodes, and transformers.

Oscillators

Packaging a Synchronous-Start Gated Oscillator, N. C. Jenson and M. E. McGee ..... Feb 98
A welded cordwood package for a 200-Mc ring-counter oscillator is described.

An Unconventional Blocking Oscillator, N. Green and R. L. McGill, Jr. ..... Feb 107
A blocking-oscillator circuit in which the output pulsewidth is independent of transformer parameters and transistor beta.

Frequency Stability in Precision Oscillators, W. J. Riley ..... Apr 42
The importance of spectral purity in the frequency of primary oscillators is analyzed, and sources of noise are discussed.

Power Supplies, Regulators

How Effective Are Selenium Devices as Surge Suppressors? D. A. Klopfer ..... Sep 38
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Gas-Discharge Tubes Regulate Vidicon Voltage Supply ..... Dec 78
TV cameras are getting smaller and industrial monitors are getting larger, with excellent picture resolution. One reason for the improvement is the use of gas-discharge tubes which can regulate the grid voltages on vidicon tubes to within 1 percent. The regulating tubes, about the size of a penny, can hold to their rated voltages within 1 volt over rated current ranges.

Semiconductors

Source Bias and the Large-Signal MOS Transistor Switch, E. M. Wilder ..... Sep 46
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High-Dielectric Capacitor ..... May 77
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Discrete Capacitors, Staff Report ..... Dec 69
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Contact Devices (switches; relays)

Circuit-Breaker Selection for Component Protection, C. A. Bodge ..... May 46
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Reliable Relay Contacts from Three-Layer Composites, W. R. Byrne ..... May 78
The use of a heat-sink layer as a means of avoiding high temperature at contact surfaces is discussed.

Achieving Optimum Reliability in Miniature Relays, C. P. Nunn ..... Aug 91
Reliable relay performance is analyzed from the standpoint of contact resistance and its causes. Contamination originating in the coil is found to be the principal cause of contact failure, and a design to isolate contacts and coil is described.

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Differential Signals Simplify Digital Control of Shaft Position, J. Nichols ..... Sep 83
The usual methods of digital shaft-position control require many mechanical components. A new method that uses integrated circuits is simpler, faster, and cheaper.

Cooling Devices

Small Fans and Blowers, Staff Report ..... Sep 69
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Transformer Design for D-C/D-C Converters, R. K. Walters ..... Jan 44
A fast, simple, graphical method for designing toroidal transformers.

Integrated Circuits

Industrial IC's Have High Noise Immunity ..... Jan 96
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Solid-State Microwave Devices: Domain and LSA Modes, J. B. Gunn, Clyde Brunquell, Charles Davis, and Glen Reem ..... Aug 67
Physical mechanisms involved in the generation of microwave oscillations in gallium arsenide are described. Current problems in design, fabrication, and application of devices are discussed.

Motors, Instrument

Miniature Synchronous Timing Motors, C. Berger. Mar 110
Two new types of synchronous stepping motors for clock mechanisms are described. For use in the range of 0 to 120 cps, the motors do not use iron or copper.

Motors, Power

Small-Motor Selection: Mechanical and Environmental Factors, Bodine Electric Co. ..... Mar 106
Mechanical and environmental considerations for selecting fractional-horsepower motors.

Stepping Motors Come of Age, T. R. Fredriksen ... Nov 36
The stepping motor is an electromechanical actuator which responds to an electrical input signal by displacing its mechanical output member a fixed increment. In today's automatic control systems, discrete or digital (rather than analog) actuation is becoming increasingly important; and the stepping motor is ideally suited to such applications. In a closed-loop system, it provides excellent reliability and good dynamic response. Positional feedback is by means of phototransistors, and the logic circuits used are simple and easily implemented.

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Packaged Operational Amplifiers, Staff Report .... Jan 73
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Electrochemical Batteries, Staff Report ..... Jul 75
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CD-CD Coulometer Controls Battery Charge, L. Belove ..... Aug 94
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use of a cadmium-cadmium cell. Circuit details for the control circuit are provided.		

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How Tolerances Affect Potentiometer Linearity, J. Doering..... A graphical method for determining linearity errors caused by potentiometer loading.	Sep	84

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Second-Breakdown Tests for Germanium-Transistor Reliability, I. W. Vahle..... The nature of second breakdown in transistors is described, and circuits and techniques for conducting sustaining-voltage and pulse-energy tests are prescribed.	Aug	54
Power Transistors, Staff Report..... A survey of trends in the design and application of power transistors. Second-breakdown-free operation, plastic packages, and silicon vs germanium are among the topics discussed.	Aug	83
How Effective Are Selenium Devices as Surge Suppressors?, D. A. Klopfer..... Thirty-two methods of connecting selenium devices as surge suppressors are discussed with regard to the transient source and the protection afforded. Selenium devices are compared with other suppressor devices.	Sep	38
Base-Spreading Resistance: How to Measure It Realistically, W.-W. Wu ..... Problems with standard techniques for measuring r'_b are overcome by a new method which approximates actual operating conditions. Supporting analytical expressions are developed.	Oct	54
Choosing Low-Level Switches—Bipolar Transistors or FET's?, L. Delhom ..... The bipolar transistor and its newer semiconductor relative, the junction field-effect transistor, have largely replaced the mechanical switch as low-level switching elements. Now the problem is to choose between the two semiconductor devices. Consideration must be given primarily to the individual application, since each device has its advantages and limitations in different circumstances.	Dec	42

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Force Transducers, Staff Report ..... Various types of force transducers are described. Problems, selection considerations, and major specifications are discussed.	May	69

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Magnet Wire, Staff Report ..... Miniaturization and high operating temperatures have created a demand for many new and different types of magnet wire in recent years. There are now several insulations for applications in the 220° C range and some special types which can be used at temperatures up to 1000°F. Ultra-fine wire for microminiaturization (down to AWG No. 60) have also been developed. The number and variety of new types of wire have led to considerable confusion in trade names and in civilian and military specifications. A cross-index of trade names and a comparison of new and old standards will aid the designer in picking the right wire for his application.	Nov	73

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Matrix-Board Connections, J. Mullen..... Concise discussion of the advantages and limitations of patchboards and matrix boards. Sealectroboard, a multi-level cross-matrix board, is compared with a patchboard in a typical application.	May	78

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Waveform Analysis Techniques, W. K. Sonnemann. A guideline for achieving maximum accuracy with minimum work in point-by-point waveform analysis.	Mar	68

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Comparison of Three Computer-Aided Design Programs, R. H. Dickhaut. PREDICT, NET-1, and CIRCUS, three programs for computer-aided design, are used to find the transient response of some typical circuits.	Jan	88
Digital Simulation of a Servo Tracking System, N. B. Kurek. The PACTOLUS simulation program is used to determine the servo lag error of a tracking system.	Feb	53
Computer Simulation of Stepping-Motor Performance, J. R. Dailey. A comparison of the simulation of stepping-motor performance by analog computer and by two digital-computer programs.	Mar	60
Computer-Aided Design of Linear Integrated Circuits, L. C. Drew, A. G. Atwood, F. R. Hawke, and T. E. Kupfrian. A computer program is used to analyze the high-frequency performance of integrated circuits.	Apr	45
Computer-Aided Design Review—Two Residual Network Programs, J. W. Miller, J. L. Wirth, and J. Staudhammer. Two programs for passive-filter network design are critically appraised in the first of a series of such reviews.	Apr	94
Computer-Aided Design Program Adapted to Time-Sharing, D. F. Dawson and W. G. Magnuson. Computer-aided circuit design using a linear network analysis program is adapted for remote teletype operation.	May	80
Converting Circuit-Design Problems into Program Language, R. S. Miles and W. M. Conner. A process by which circuit diagrams can be converted into equations suitable for computer analysis is described. Insight into the process of computer-aided circuit design is stressed.	Jul	46
Computer-Aided Design Review—The TAG Program, L. C. Drew, G. J. Muscha, F. H. Branin, A critical, state-of-the-art review of the TAG program for network and circuit analysis. This is the second in a series of such reviews.	Jul	88
Computer-Aided Design Review—NASAP, E. J. Hoffman, L. D. McNamee, F. F. Kuo, and G. W. Zobrist. A critical review by users and state-of-the-art experts of the NASAP Network Analysis for System Application Program. This is the third in a series of such reviews.	Aug	101
Solving Matrix Problems on Small Computers, R. T. Berger. Matrix-multiplication techniques for the optimum use of limited computer memory space.	Sep	44
Computer-Aided Design Review—CIRCUS, J. Rainbolt, H. Sloate, T. E. Stern, H. D. Eskin, and S. Sedore. Users appraise CIRCUS, a general-purpose circuit-analysis program, and find that with some minor defects it has excellent capabilities, including high speed.	Oct	108
Analyzing Control Systems with a Digital Computer I. A Network-Analysis Approach Simplifies the Problem II. Operational-Amplifier Models Ease Analysis by Simulation, R. W. Jensen and D. B. Herbert. Many circuit designers now use flexible computer programs to analyze the performance of a wide variety of networks. These general-purpose programs are proving to be practical tools for designing electrical and mechanical control systems and for many other engineering applications, including semiconductor circuit design. The programs are so versatile that they allow several alternate approaches to a single problem. For example, the ECAP program can be used in contrasting ways to analyze such control systems as a motor speed regulator and a position control system.	Nov	42
Mathematical Programming for Optimal Design, L. S. Lasdon and A. D. Waren. Most engineers "optimize" their design by relying on their long experience or by using cut-and-try methods. Mathematical techniques for achieving optimal designs have usually been considered to be too complex or too laborious for practical work; with the advent of the digital computer, however, they have proven to be practical engineering tools. Here is an introduction to modern computer-aided techniques for optimizing the design of circuits, equipment, and systems.	Nov	53
Operational-Amplifier Modeling for Computer Analysis, H. C. Jones. A simplified circuit model of an operational amplifier, useful in design of active filters, can be easily represented by ECAP, a general circuit-analysis program. The model is a bridged-T network which gives an accurate approximation of desired gain and phase characteristics with varying frequency while maintaining an almost constant impedance across the input.	Dec	77

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Electrical Insulation and Dielectrics

Principles of Dielectric Engineering, A. Blanck. Basic concepts of conductivity, capacitance and loss, and high voltage in dielectrics are discussed. Environmental effects on dielectric constant, dissipation factor, and other dielectric parameters are described. The significance of various methods of measuring dielectric characteristics is also covered.	Jun	73
Flexible Insulation, Staff Report. A review of the flexible materials designed to meet today's stringent requirements. Electrical and mechanical characteristics of papers, cloth, film, tape, laminates, and tubing are discussed.	Jun	89
Effects of Aging on Polyurethane Insulation, J. Delmonte. Various types of castable polyurethane compounds are compared with respect to their ability to withstand moisture and temperature without degradation of electrical and physical properties.	Jun	97

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Computing, Data, Recording

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Real-Time Electro-Optical Information Processors, S. Herman ... Operation and limitations of real-time electro-optical information processors. Basic techniques for practical processing configurations are discussed.	Jun	52
Design Factors in Magnetic Pulse Recording, F. D. Risko ... There are two basic techniques used for mass storage of digital or binary information on moving magnetic media: contact and noncontact. The recording concept used in either case is relatively simple, but the designer of hardware for such systems must take into account complex, interrelated parameters such as resolution, amplitude, and packing density. The goal, in any case, is to get as many bits per inch on as small an area as possible—with high resolution.	Dec	57

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Matching D-C Drives and Motors, C. J. Newell ... Analysis of the effects of ripple and form factor on motor heating, commutation, and overall performance when the drive uses d-c rectification (SCR's). Curves for use in designing drive circuits and derating motors are given.	Jun	38
Estimating Electrohydraulic Servo Parameters, K. S. Day ... The transfer function of an electrically actuated hydraulic servomechanism can be determined experimentally and graphically—with a minimum of equipment and simple control-system analysis.	Jul	42
A Computer Analysis of Nonlinear Frequency Response, J. J. Carney ... Frequency responses of nonlinear control systems are analyzed by computer-aided integration methods.	Jul	83
Analyzing Control Systems with a Digital Computer I. A Network-Analysis Approach Simplifies the Problem II. Operational-Amplifier Models Ease Analysis by Simulation R. W. Jensen and D. B. Herbert ... Many circuit designers now use flexible computer programs to analyze the performance of a wide variety of networks. These general-purpose programs are proving to be practical tools for designing electrical and mechanical control systems and for many other engineering applications, including semiconductor circuit design. The programs are so versatile that they allow several alternate approaches to a single problem. For example, the ECAP program can be used in contrasting ways to analyze such control systems as a motor speed regulator and a position control system.	Nov	42
Stepping Motors Come of Age, T. R. Fredriksen ... The stepping motor is an electromechanical actuator which responds to an electrical input signal by displacing its mehcanical output member a fixed increment. In today's automatic control systems, discrete or digital (rather than analog) actuation is becoming increasingly important; and the stepping motor is ideally suited to such applications. In a closed-loop system, it provides excellent reliability and good dynamic response. Positional feedback is by means of phototransistors, and the logic circuits used are simple and easily implemented.	Nov	36

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Frequency Counters, Staff Report — One of the most ubiquitous electronic instruments, the frequency counter, is surveyed with respect to capabilities and limitations. Results indicate that some problems still exist, primarily in the area of noise sensitivity, but that these can be overcome with proper usage.	Oct	93
A Drift-Free Method of Measuring Pulse Height, D. Metcalf and R. Kusich — Pulse-height measurement on an oscilloscope, often used as a test for amplifier gain and stability, can be a problem due to drift of the CRO preamplifier. A chopper, an adjustable reference voltage, and a digital voltmeter give drift-free results.	Oct	101
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A Shortcut to Design: Choosing the Limits on the Convolution Integral, G. F. Ross — A method for choosing the specific limits on the convolution integral. Functions commonly used in signal and system analysis are tabulated.	Sep	42
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- Integrated Circuits
- Inverters
- Memory
- Oscillators
- Power Supplies, Regulators
- Pulse
- Semiconductors
- Signal Conditioning
- Test and Measurement
- Tuning Circuits

Components, Electrical/Electronic
- Capacitors
- Contact Devices (switches, relays)
- Converters
- Cooling Devices
- Display
- Electron Tubes
- Inductive Components (transformers, inductors)
- Integrated Circuits
- Lasers
- Magnetic Devices
- Microcircuit Assemblies
- Microwave Devices
- Motors, Instrument
- Motors, Power
- Operational Amplifiers
- Optical and Infrared Devices
- Photoelectric Devices
- Power Sources, Supplies
- Printed and Embedded Circuits
- Protective Devices
- Resistive Components (resistors, potentiometers)
- Semiconductor Devices
- Thermoelectric Devices
- Timers
- Transducers
- Wire and Cable
- Wiring Devices (connectors, terminals)

Components, Mechanical
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- Drive Elements (brakes, clutches)
- Gears (trains, reducers)
- Hydraulic, Pneumatic

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- Control
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- Display
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- Power, Electrical
- Surveillance (detection)

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- Production Testing
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- Testing of Components
- Testing of Materials
- Testing of Systems

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- Communications Theory
- Life Science (bionics, engineering psychology)
- Materials Science
- Mathematics
- Measurement Theory
- Network Theory
- Optics
- Physics
- Systems Theory